Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method of controlling path length in a quantum cryptographic key distribution (QKD) system, performed by a QKD endpoint device, the method comprising:

receiving, using a transceiver of the QKD endpoint device, a signal identifying a plurality of symbols as training symbols over a QKD path;

receiving, using the transceiver, the plurality of training symbols transmitted from a QKD transmitter over the QKD path via quantum cryptographic mechanisms;

determining, using a processing unit of the QKD endpoint device, probabilities of detection events associated with the received plurality of training symbols;

estimating, using the processing unit, a phase error associated with transmission of the plurality of training symbols over the QKD path, the estimating being based on the determined probabilities; and

controlling, using the processing unit, a length of the QKD path based on the ~~received plurality of training symbols~~ estimated phase error.

2-6. (Canceled)

7. (Currently amended) The method of claim [[4]] 1, where estimating the phase error comprises:

performing a least squares estimation of the phase error using the determined probabilities.

8. (Previously presented) The method of claim 1, where estimating the phase error comprises:

employing at least one Kalman filter to estimate the phase error.

9. (Currently amended) The method of claim [[4]] 1, where estimating the phase error comprises:

performing a robust least squares estimation of the phase error using the determined probabilities.

10. (Previously presented) The method of claim 9, where the robust least squares estimation comprises at least one of least absolute residuals and Bisquare weights.

11. (Currently amended) A system configured to automatically initialize a length of a quantum cryptographic key distribution (QKD) path in a QKD system, comprising:

a QKD receiver configured to determine whether training symbols are to be received and to receive training symbols from a QKD transmitter over the QKD path;

a phase shifting element disposed on the QKD path; and

processing logic configured to:

determine probabilities of detection events associated with received training symbols;

estimate, using a least squares estimation, a phase error associated with transmission of the received training symbols over the QKD path based on the determined probabilities; and

automatically initialize the length of the QKD path, using the phase shifting element, based on the ~~received training symbols~~ estimated phase error.

12. (Currently amended) A computer-readable memory device containing instructions configured to control at least one processor to perform a method of

controlling path length in a quantum cryptographic key distribution (QKD) system, the method comprising:

receiving a signal identifying a plurality of symbols as training symbols over a QKD path;

receiving the plurality of training symbols transmitted from a QKD transmitter over the QKD path via quantum cryptographic mechanisms;

determining probabilities of detection events associated with the received plurality of training symbols;

estimating a phase error associated with transmission of the plurality of training symbols over the QKD path based on the determined probabilities, the estimating being performed using at least one of least absolute residuals or Bisquare weights; and

controlling a length of the QKD path based on the ~~plurality of received symbols~~ estimated phase error.

13. (Currently amended) A method of automatically controlling a path length in a quantum cryptographic key distribution system, the path comprising a first interferometer and a second interferometer, the method comprising:

employing a phase shifting element in the second interferometer;

determining, using a processing unit of the system, probabilities of detection events associated with training symbols transmitted over the path, where the training symbols were distinguished from other types of symbols transmitted over the path;

estimating, using the processing unit, a phase error based on a least squares estimation using the determined probabilities; and

automatically adjusting, using the processing unit, the phase shifting element to control the path length based on the estimated phase error ~~training symbols transmitted over the path via quantum cryptographic mechanisms, where the training symbols were distinguished from other types of symbols transmitted over the path~~.

14. (Previously presented) The method of claim 13, where the phase shifting element comprises a fiber stretcher.

15. (Currently amended) The method of claim 14, where automatically adjusting the phase shifting element comprises:

adjusting a voltage applied to the fiber stretcher based on the training symbols transmitted over the path.

16. (Previously presented) The method of claim 13, where the phase shifting element comprises a phase modulator.

17. (Previously presented) The method of claim 16, where automatically adjusting the phase shifting element comprises:

adjusting a voltage applied to the phase modulator based on the training symbols transmitted over the path.

18-25. (Canceled)

26. (Currently amended) A system configured to automatically control a path length in a quantum cryptographic key distribution (QKD) system, comprising:

a QKD path including a first interferometer and a second interferometer;

a phase shifting element disposed in at least one of the first and second interferometers; and

processing logic configured to:

determine probabilities of detection events associated with received training symbols, where the training symbols were distinguished from other types of received symbols;

estimate a phase error associated with the training symbols, using at least one of least absolute residuals or Bisquare weights applied to the determined probabilities; and

automatically adjust the phase shifting element to control a length of the path based on training symbols transmitted over the QKD path via quantum cryptographic mechanisms based on the estimated phase error~~, where the training symbols were distinguished from other types of symbols transmitted over the path~~.

27. (Currently amended) A method of automatically controlling a path length in a quantum cryptographic key distribution (QKD) system, comprising:

employing a feedback system in the QKD system, where the QKD system comprises a first interferometer and a second interferometer;

receiving, using a transceiving unit of the QKD system, training symbols transmitted over the path from the first interferometer to the second interferometer via quantum cryptographic mechanisms, where the training symbols are distinguished from data symbols;

determining, using a processing unit of the QKD system, probabilities of detection events associated with the training symbols transmitted over the path;

employing, using the processing unit, at least one Kalman filter to estimate a phase error associated with the training symbols based on the determined probabilities; and

automatically controlling the path length, using the feedback system, based on the ~~training symbols transmitted over the path from the first interferometer to the second interferometer~~ estimated phase error.

28. (Previously presented) The method of claim 27, where the feedback system comprises a phase shifting element.

29. (Previously presented) The method of claim 28, where the phase shifting element comprises a fiber stretcher.

30. (Previously presented) The method of claim 29, where automatically controlling the path length comprises:

adjusting a voltage applied to the fiber stretcher based on the training symbols transmitted over the path.

31. (Previously presented) The method of claim 28, where the phase shifting element comprises a phase modulator.

32. (Previously presented) The method of claim 31, where automatically controlling the path length comprises:

adjusting a voltage applied to the phase modulator based on the training symbols transmitted over the path.

33-40. (Canceled)

41. (Currently amended) A quantum cryptographic key distribution (QKD) endpoint device, comprising:

a QKD receiver configured to:

receive symbols transmitted over a QKD path via quantum cryptographic mechanisms, and

distinguish training symbols from data symbols in the received symbols; and

a feedback system configured to:

determine probabilities of detection events associated with the training symbols;

estimate, using at least one of absolute residuals or Bisquare weights, a phase error associated with the training symbols based on the determined probabilities; and

control a length of the QKD path based on the ~~received training symbols~~ estimated phase error.

42. (Previously presented) The QKD endpoint of claim 41, where the feedback system comprises a phase shifting element.

43. (Previously presented) The QKD endpoint of claim 42, where the phase shifting element comprises a fiber stretcher.

44. (Previously presented) The QKD endpoint of claim 42, where the phase shifting element comprises a phase modulator.

45-51. (Canceled)

52. (Currently amended) A method of controlling a path length in a quantum cryptographic key distribution (QKD) system, comprising:

receiving, using a transceiving unit of the QKD system, one or more symbols that indicate that a subsequent sequence of symbols comprises training symbols;

determining, using a processing unit of the QKD system, probabilities associated with a plurality of detection events, the plurality of detection events being associated with the training symbols received over a path in the QKD system via quantum cryptographic mechanisms;

estimating, using the processing unit, a phase error based on the determined probabilities and by performing a robust least squares estimation using at least one of absolute residuals or Bisquare weights; and

controlling, using the processing unit, a length of the path based on the ~~determined probabilities~~ estimated phase error.

53. (Previously presented) The method of claim 52, where the probabilities comprise conditional probabilities.

54-59. (Canceled)

60. (Currently amended) A quantum cryptographic key distribution (QKD) endpoint device, comprising:

a QKD receiver configured to:

receive a sequence of symbols transmitted over a QKD path via quantum cryptographic mechanisms, and

determine whether the sequence of symbols corresponds to a sequence of training symbols;

a phase shifting element disposed on the QKD path; and

processing logic configured to:

determine, based on determining that the sequence of symbols corresponds to a sequence of training symbols, conditional probabilities associated with a plurality of detection events, the plurality of detection events being associated with the sequence of symbols,

estimate, using at least one Kalman filter, a phase error associated with the sequence of training symbols based on the determined conditional probabilities and

adjust the phase shifting element to control a length of the QKD path based on the ~~determined conditional probabilities~~ estimated phase error.

61. (Currently amended) A computer-readable memory device containing instructions configured to control at least one processor to perform a method of

controlling a path length in a quantum cryptographic key distribution (QKD) system, the method comprising:

receiving one or more symbols that indicate that a subsequent sequence of symbols comprises training symbols;

determining probabilities associated with a plurality of detection events, the plurality of detection events being associated with the training symbols received over a path in the QKD system via quantum cryptographic mechanisms;

estimating a phase error for the plurality of detection events, the phase error being estimated based on the determined probabilities using a least squares estimation; and

controlling a length of the path based on the ~~determined probabilities~~ estimated phase error.

62. (Currently amended) A system configured to control a path length in a quantum cryptographic key distribution (QKD) system, comprising:

means for receiving one or more symbols that indicate that a subsequent sequence of symbols comprises training symbols;

means for determining probabilities associated with a plurality of detection events, the plurality of detection events being associated with the training symbols received over a path in the QKD system via quantum cryptographic mechanisms;

means for estimating a phase error for the plurality of detection events, the phase error being estimated based on the determined probabilities using a least squares estimation; and

means for controlling a length of the path based on the ~~determined probabilities~~ estimated phase error.